State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council

AGENCY OF NATURAL RESOURCES

Rd #1, Box 2300
Morrisville, Vt. 05661

DEPT. OF FORESTS, PARKS AND RECREATION
TEL. (802) 888-5733

DEC 28 1991

VT

23 December 1992

Margaret Miller-Weeks
USDA-Forest Service
P.O. Box 64
Durham, New Hampshire 03824

Dear Margaret:

Here is a copy of the annual insect and disease condition report for northern Vermont. Keep in mind that the final acreage figures for areas detected by aerial survey will change as soon as we get our GIS maps and figures, which should be in another week. This applies to Barb's report as well. We'll forward the maps and updated acreage as soon as we get it.

Have a Happy Holiday Season!!

Sincerely,

Ron

Ronald S. Kelley
Forest Protection Specialist

jr
encs.
cc: H.B. Teillon

printed on recycled paper

VT

AGENCY OF NATURAL RESOURCES

DEPARTMENT OF FORESTS, PARKS AND RECREATION

STATE OF VERMONT

FOREST INSECT AND DISEASE CONDITIONS
NORTHERN REGION

CALENDAR YEAR 1991

Prepared by:

Ronald S. Kelley
Forest Resource Protection Specialist

13 December 1991

Bernard Barton
Jay Lackey
Hollis Prior
John St. Arnauld
Pete Reed
Tom Simmons
Forest Resource Protection Technicians

INTRODUCTION

The information in this report is based largely on aerial surveys to detect defoliation, dieback, and mortality, as well as ground surveys and observations of forest resource protection personnel and other forestry and department staff.

Aerial surveys were flown in (1) mid-to-late June to detect early defoliators such as pear thrips; (2) mid-to-late July to detect gypsy moth, leaf scorch, etc.; and (3) late August to early September to detect late defoliators such as maple leaf cutter and birch skeletonizer.

WEATHER SUMMARY

The 1991 growing season began with bud break and leaf development of trees and shrubs at least a week earlier than normal. There was ample moisture available to plants during this period. The overall growing season was warmer than normal, with near-normal precipitation; however, rainfall was poorly distributed, with moderate drought conditions in June and July. Precipitation measured at the District IV weather stations was fairly typical for the region (Table 1), except that some northern portions of the region received much less rainfall. August was much wetter than normal, primarily due to Hurricane Bob, which skirted the New England coast on 19 August.

A late spring frost, 19-20 May, killed scattered new growth on Christmas trees and leaves of sensitive hardwood trees such as butternut and some white oak. 1991 was a heavy seed year for conifers such as northern white cedar, balsam fir, spruce, and hemlock, but seed for hardwood species such as sugar maple was scarce.

Table 1. North-Central Vermont Precipitation During the 1991 Growing Season*

MONTH	AVERAGE PRECIPITATION	DEPARTURE FROM NORMAL	% OF NORMAL
May	3.02"	- .20"	94%
June	1.70"	- 1.57"	52%
July	2.51"	- 1.15"	69%
August	5.61"	+ 2.24"	166%
September	4.25"	+ 1.05"	133%

*Vermont Division of Forestry Stations in Wolcott, Barre, Orange, Randolph, Fairlee, and Worcester.

Cherry Scallop Shell Moth, Hydria prunivorata, heavily defoliated black cherry trees within a 138 acre hardwood stand in Greensboro, as detected by aerial survey. Elsewhere, the webs built by this insect were more common than in previous years, but damage was widely scattered.

Forest Tent Caterpillar, Malacosoma disstria, populations continued to be very low this year. Few larvae were observed in sugar maple stands and only two traps of 20 (Waterbury) in northern Vermont caught moths in 1990 (Table 3). None of the 27 pheromone traps placed in the Green Mountain National Forest by the U.S. Forest Service caught any forest tent caterpillar moths.

Table 3. Average Number of Forest Tent Caterpillar Moths Caught in Pheromone Traps, 1988-1991*

Location	1988	1989	1990	1991
Roxbury	0.0	0.6	0.2	0.0
Waterbury	1.2	3.6	0.0	0.4
Waterville	0.2	2.2	0.0	0.0
Fairfield	-	0.0	0.0	0.0
Bethel	-	0.4	0.2	0.4
Sherburne	-	2.6	0.0	0.0
Barnard	0.6	-	2.6	2.2
Underhill	-	-	-	0.0
Average	0.6	1.6	0.4	0.4

*Multi-pher traps baited with RPC-2 component lures, 5 traps per location.

JAN 24 1992

FOREST INSECTS

HARDWOOD DEFOLIATORS

Birch Leaf Miner, Fenusa pusilla, defoliation of birch stands was more common than usual this year, with 26,422 acres of damage aerially detected (Table 2). Most of the heavy damage occurred within stands of paper birch in the Northeast Kingdom (Figure 1). Damage to paper birch was made more severe by drought stress in all areas and by additional defoliation caused by birch skeletonizer, Bucculatrix canadensisella, in Northeast Kingdom stands.

Table 2. 1991 Mapped Acres of Birch Leaf Miner Defoliation*

COUNTY	MODERATE	HEAVY	TOTAL
Addison	64	9	73
Caledonia	0	9222	9222
Chittenden	222	0	222
Essex	0	8380	8380
Franklin	181	0	181
Grand Isle	29	0	29
Orleans	0	8315	8315
TOTAL	496	25926	26422

*Moderate = 30-60%, Heavy = greater than 60% defoliation.

Birch Skeletonizer, Bucculatrix canadensisella, defoliation of white and yellow birch was evident in scattered central and northeastern locations by late August to early September. Areas detected from the ground included heavy defoliation of a 20 acre yellow birch stand in Hardwick (Caledonia County) and of approximately 300 acres of high elevation white birch along the Worcester Mountain range, plus other scattered areas of lighter damage in East Montpelier, Williamstown, Calais (Washington County), and Brookfield (Orange County). This insect also contributed to the paper birch defoliation in the Northeast Kingdom attributed to birch leaf miner. In addition, yellow birch trees attacked by B. canadensisella were defoliated to a lesser degree by birch leaf folder, Ancylis discigerana.

Gypsy Moth, Lymantria dispar, populations collapsed this year with only 1131 acres of defoliation aerially detected compared to 13,769 acres in 1990 (Table 4). Damage was largely confined to small scattered areas in Addison and Chittenden Counties (Figure 2). No defoliation is predicted for 1992.

Table 4. Mapped Acres of 1991 Gypsy Moth Defoliation

County	Damage Level* Light	Moderate	Heavy	Total Acres
Addison	0	349	294	643
Chittenden	42	163	164	369
Franklin	0	9	11	97
Grand Isle	0	15	7	22
Total	42	536	476	1,131

*Light = less than 30% defoliation
Moderate = 30-60%
Heavy = greater than 60%

Counts of 1991 gypsy moth egg masses within focal area monitoring plots were very low, reflecting a general population decline (Table 5). The only focal area to receive visible defoliation this year was Brigham Hill. It appears that the population cycle for this location was delayed one year by the early intervention with a Bacillus thuringiensis application in 1988.

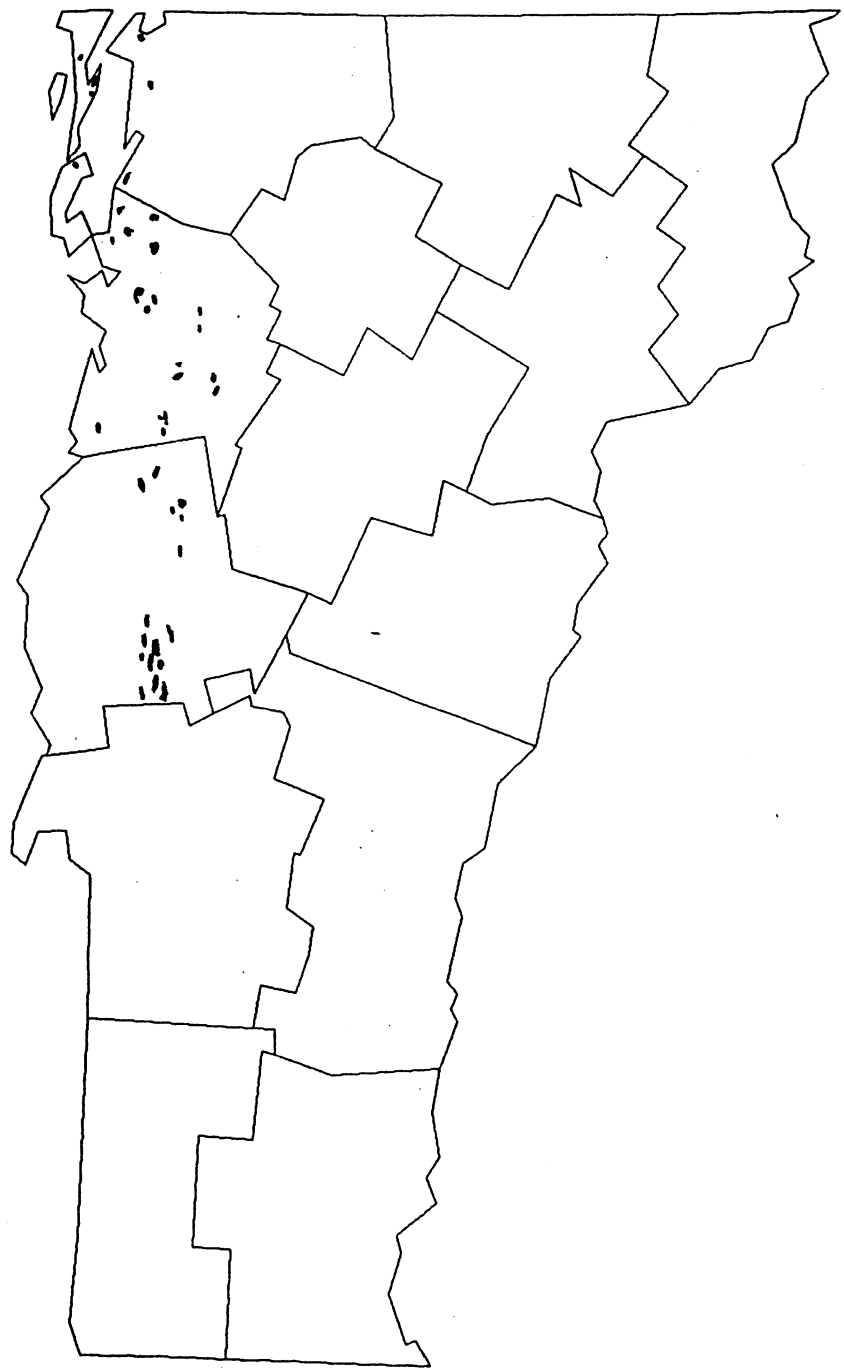
Table 5. Gypsy Moth Egg Mass Counts From Focal Area Monitoring plots: 1986-1991

Plot Location	Number of Egg Masses* 1986	1987	1988	1989	1990	1991
Arrowhead**	5	21	48	96	3	2
Brigham Hill***	10	37	28	74	212	22
Middlesex	0	0	1	19	23	3
Sandbar	-	45	173	129	57	6
Average	5	26	63	80	74	8

*Average per plot for two, 15m diameter (.045AC) burlap-banded plots.
**Aerial sprayed with B.t. (Foray) in 1990.
***Aerial sprayed with B.t. (SAN415) in 1988.

Figure 2.

1991
GYPSY MOTH DEFOLIATION IN VERMONT



VT

Maple Leaf Cutter, Paraclemensia acerifoliella, populations increased again this year throughout the region. Most heavy damage was confined to lower crowns of sugar maple as well as understory trees, but 2,036 acres were detected by aerial survey compared to 467 acres in 1990 (Table 6). Caledonia County with 1,769 acres had the most visible damage (Figure 3). An additional _____acres of _____defoliation were detected in _____ County by ground visits.

Table 6. 1991 Mapped Acres of Heavy Maple Leaf Cutter Defoliation*.

County	Acres
Caledonia	1769
Chittenden	130
Orleans	137
TOTAL	2036

*Heavy = more than 60% defoliation.

Area of damage detected is the greatest since 1982 and populations are expected to continue increasing in 1992. Past outbreaks of this pest have tended to increase slowly, remain at high levels for many years, and then decrease slowly. Duration of the last outbreak was about 10 years.

Saddled Prominent, Heterocampa guttivata, larvae were occasionally observed in the Northeast Kingdom and moths were easily caught in light traps, as well as experimental pheromone traps deployed in two Orange County maple stands. No defoliation was detected and pupae were difficult to find within the pheromone trapping areas.

Page 8 is
F-8 3
MLC defoliation

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
American Aspen Beetle *Gonioctena americana*			N.o.*
American Dagger Moth *Acronicta americana*			N.o.
Birch Leaf Folder *Ancylis discigerana*	Yellow Birch	Widespread	Mostly light damage. Contributed to heavier damage when combined with other birch defoliators.
Birch Leaf Miner *Fenusa pusilla*	Paper Birch Gray Birch Yellow Birch	Widespread	S.n.**
Birch Skeletonizer *Bucculatrix canadensisella*			S.n.
Bruce Spanworm *Operophtera bruceata*	Sugar Maple	Throughout	Light defoliation observed in Cabot. Moths frequently observed in November throughout. More common around lights and windows at night in Stowe than during last outbreak in 1983.
Cecropia Moth *Hyalophora cecropia*			N.o.
Cherry Scallop Shell Moth *Hydria prunivorata*	Black Cherry	Widespread	More common than in previous years. Caused heavy defoliation of overstory cherry in a 138 acre hardwood stand in Greensboro, as detected by aerial survey.

*N.o. = not observed
**S.n. = see narrative

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Dogwood Sawfly *Macremphytus tarsatus*	Dogwood	Bloomfield	Light defoliation.
Early Birch Leaf Edgeminer *Messa nana*			N.o.
Eastern Tent Caterpillar *Malacosoma americanum*	Cherry Apple	Widespread	Common; similar to 1990 levels.
Elm Leaf Beetle *Pyrrhalta luteola*	American Elm	Widely scattered	Light defoliation.
Elm Leaf Miner *Fenusa ulmi*	Elm		N.o.
Euonymus Caterpillar *Yponomeuta multipunctella*	Fire Brush	Peacham	
Fall Cankerworm *Alsophila pometaria*			N.o.
Fall Webworm *Hyphantrea cunea*	Hardwoods	Widespread	Very noticeable. Increase over 1990 levels.
Forest Tent Caterpillar *Malacosoma disstria*			S.n.
Green Striped Mapleworm *Anisota rubicunda*	Maples	Northeast Kingdom	Larvae observed; no visible damage.
Gypsy Moth *Lymantria dispar*			S.n.
Half Winged Geometer *Phigalia tites*			N.o.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Imported Willow Leaf Beetle *Plagiodera versicolora*	Willows	Franklin Washington Counties	Common; caused moderate defoliation including 25 acres mapped in Enosburg.
Japanese Beetle *Popillia japonica*	Ornamentals	Widespread	Abundant. Increasing compared to 1990. Heavy on birch in Chittenden County.
Large Aspen Tortrix *Choristoneura conflictana*			N.o.
Linden Looper *Erranis tiliaria*			N.o.
Locust Leaf Miner *Odontata dorsalis*	Black Locust	Chittenden Washington Counties	Some moderate to heavy defoliation in same locations as in the past; similar to 1990.
Maple Leaf Cutter *Paraclemensia acerifoliella*			S.n.
Maple Leafblotch Miner *Cameraria aceriella*	Sugar Maple	Addison Chittenden Franklin Counties	Fairly common throughout.
Maple Trumpet Skeletonizer *Epinotia aceriella*	Sugar Maple Red Maple	Widespread	Unusually common again this year, occasionally causing moderate defoliation of sugar maples; especially heavy in Addison County.
Maple Webworm *Tetralopha asperatella*	Sugar Maple	Widespread	Common again this year. Increasing over 1990 levels; light defoliation.
Mountain Ash Sawfly *Pristiphora geniculata*	Mountain Ash	Chittenden Addison Counties	Locally heavy defoliation of high-elevation wild trees. Unusually absent on ornamentals.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Oak Leafroller *Archips semiferanus*			N.o.
Oak Leaf Tier *Croesia semipurpurana*	Red Oak	Essex	One of three pheromone traps on Brigham Hill caught 1 moth, but all three traps in Milton (Sandbar) were negative; same as 1990 results.
Oak Skeletonizer *Bucculatrix ainsliella*			N.o.
Orange-humped Mapleworm *Symmerista leucitys*			N.o.
Pear Sawfly *Caliroa cerasi*			N.o.
Pin Oak Sawfly *Caliroa sp.*			N.o.
Red-humped Oakworm *Symmerista canicosta*	Red Oak		N.o.
Rose Chafer *Macrodactylus subspinosus*	Hardwood Ornamentals	St.Johnsbury Danville	Heavy.
Saddled Prominent *Heterocampa guttivata*			S.n.
Satin Moth *Leucoma salicis*	Balsam Poplar Cottonwood	Widespread	Locally heavy defoliation of ornamentals in most counties; noticeably increasing.
Solitary Leaf Roller *Sparganothis pettitana*	Sugar Maple	Lamoille County	Scattered, light, same as 1990.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Solitary Oak Leaf Miner *Cameraria hamadryadella*			N.o.
Spiny Elm Caterpillar *Nymphalis antiopa*			N.o.
Spring Cankerworm *Paleacrita vernata*			N.o.
Uglynest Caterpillar *Archips cerasivoranus*	Cherry	Widely scattered	Occasionally observed, similar to 1990.
White-marked Tussock Moth *Orgyia leucostigma*	Mountain Ash	Waterville	Heavy defoliation of a potted seedling.

VT

SOFTWOOD DEFOLIATORS

Hemlock Looper, Lamdina fiscellaria, adults were very noticeable throughout most of the region, especially during September. There was no visible defoliation of hemlock or other conifer hosts, but the sudden abundance of moths is of concern, especially since a related hemlock looper, L. athasaria is causing heavy hemlock defoliation in southern Windham County. Adults of L. fiscellaria emerged from early August 'til late October. A couple of moths were captured in oak leaf tier pheromone traps in Milton and Essex, collected 5 and 9 August, and more were present in spruce budworm and forest tent caterpillar collected in mid-August. Black Light traps deployed by the University of Vermont (J.R. Grehan) at three elevations along the west slope of Mount Mansfield caught L. fiscellaria moths from 7 August 'til 25 October, with peak capture (50/night) during early to mid-September. The Underhill State Park site at an elevation of 600 meters caught the most moths, with a total of 580 for the season. A smaller Black Light trap deployed at the edge of a Morristown hemlock stand in late September caught a maximum of about 20 moths per night.

Spruce Budworm, Choristoneura fumiferana, continued at low levels, with no visible defoliation or larvae detected, but there was a sudden increase in the number of moths captured in pheromone traps (Table 7, Figure 4). This is the most moths caught since 1984 when the last outbreak collapsed (Figure 5). The U.S. Forest Service caught fewer moths in their pheromone traps located in six Green Mountain National Forest locations. These traps averaged only 0.6 moths per trap. High moth catch may be due to a blow-in from higher population areas in Canada, since north-central New York also experienced a sudden increase in moth catch. Moth catch inn 1992 should tell the story; if it increases again, it may signal the beginning of another outbreak.

Figure 5.

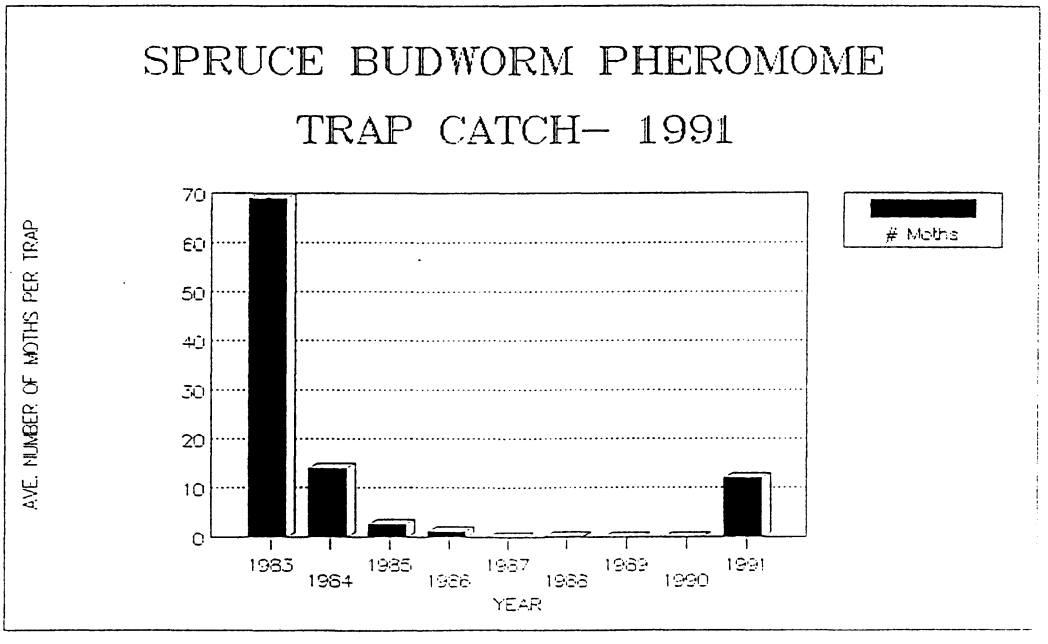
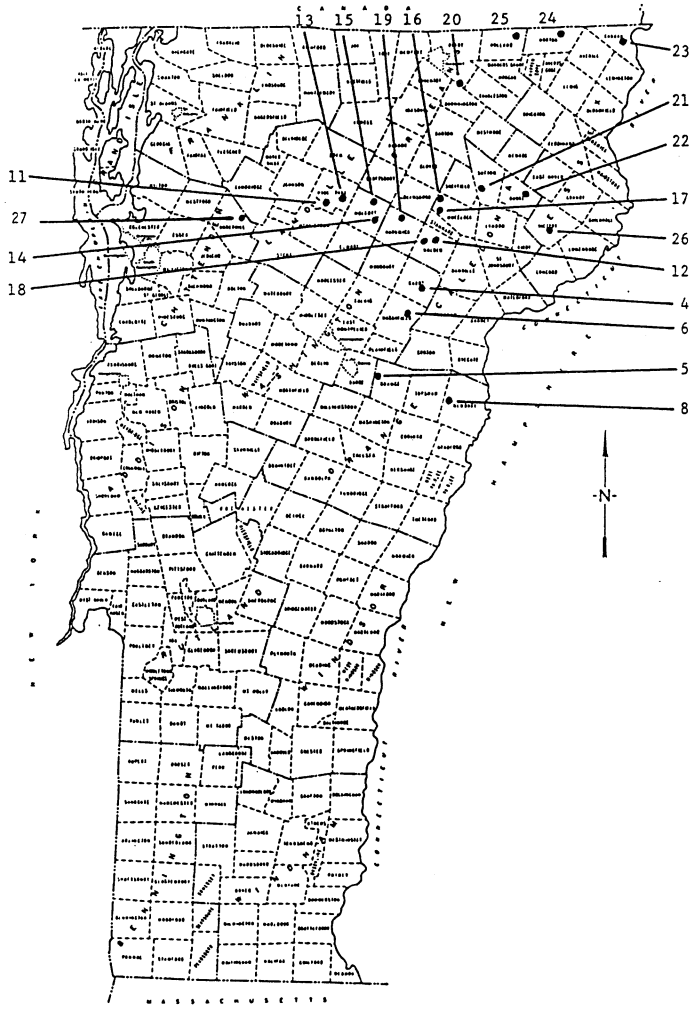


Table 7. Average Number of Spruce Budworm Moths Caught Per Trap in Pheromone Traps, 1987-1991*.

Lure	1988	1989	1990	1991
PVC	0.05	0.00	--	--
Biolure	--	0.03	0.02	12.00
Number of Sites	20	10 per lure	20	21

*Multi-pher traps.

Figure 4. Spruce Budworm Pheromone Plot Locations and Average Moths per Trap.



Location	Moths/Trap
4. Danville Hill	15.3
5. Reservoir	28.3
6. Marshfield Pd.	10.0
8. Scotch Hollow	16.3
11. Centerville	17.3
12. Coles Pd.	7.5
13. Diggins	11.3
14. Wolcott F&G	2.7
15. Bear Swamp	8.7
16. Withers	11.3
17. Mason	3.7
18. Star School	17.7
19. Beagle Club	6.3
20. Brownington Pd.	12.0
21. Calendar Brk.	30.0
22. Chieppo	3.5
23. Bunnel Brk.	2.0
24. Norton Cem.	3.0
25. Holland Pd.	3.3
26. Victory Bog	5.7
27. VMC	31.7
Ave.	12.0

OTHER SOFTWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Arborvitae Leaf Miner *Argyresthia thuiella*	Arborvitae	Widespread	Numerous calls in Caledonia County.
Balsam Fir Sawfly *Neodiprion abietis*			N.o.
European Spruce Needleminer *Taniva albolineana*	White Spruce	Northfield	Moderate defoliation on two ornamentals.
Green Hemlock Needleminer *Coleotechnites apicitripunctella*			N.o.
Hemlock Looper *Lambdina fiscellaria*	Hemlock		S.n.
Introduced Pine Sawfly *Diprion similis*	White Pine Scots Pine	Widely scattered	Very light damage frequently reported. Present in 50 acres of Christmas trees. Increasing; not observed in 1990.
Larch Casebearer *Coleophora laricella*	European Larch Japanese Larch Eastern Larch	Widely scattered	Light damage--down somewhat from 1990.
Larch Sawfly *Pristophora erichosonii*			N.o.
Nursery Pine Sawfly *Diprion frutetorum*	Scots Pine	Newport	Light damage to Christmas trees. Not observed in 1990.
Pine False Webworm *Acantholyda erythrocephala*	Scots Pine	Brookfield	One report of moderate Christmas tree damage; not observed in 1990.
Pine Webworm *Tetralopha robustella*			N.o.

16 - ?

OTHER SOFTWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Red-Headed Pine Sawfly *Neodiprion lecontei*	Red Pine		N.o.
Spruce Bud Moth *Zeiraphera canadensis*	White Spruce	Walden Peacham Cabot Lyndon Wolcott	Light infestations Christmas tree plantations; stable to decreasing.
Spruce Budworm *Choristoneura fumiferana*			S.n.
Spruce Webspinning Sawfly *Cephalcia fascepennis*		Danville Concord Lyndon St. Johnsbury Lunenburg Canaan	Moderate damage to ornamentals.
White Pine Sawfly *Neodiprion pinetum*			N.o.
Yellow-headed Spruce Sawfly *Pikonema alaskensis*	Blue Spruce	Montpelier	Heavy on two ornamentals. Overall, down from 1990.

SAPSUCKING INSECTS, MIDGES, AND MITES

Balsam Gall Midge, Paradiplosis tumifex, damage to balsam fir Christmas trees continued this year, but area and severity of damage dropped from 1990 levels. Of the northern Vermont plantations annually surveyed for pests, 146 acres of balsam fir was reported infested compared to 253 acres in 1990 and 157 acres in 1989. Moderate to heavy damage was reported for only 31 of these acres compared to 144 acres in 1990. Galls examined this fall from Stannard anad Wolcott showed that more than 80 percent of the galled needles from each location contained larvae of the non-gall-making midge, Dasineura balsamifera, which ends up preventing P. tumifex from reaching maturity. Thus, the dominant midge in 1992 for most locations should be the beneficial one, and damage should decrease significantly.

Balsam Twig Aphid, Mindarus abietinus, damage was even more widespread than in 1990, but area and severity in northern Vermont dropped somewhat. Damage was reported for 256 acres of fir compared to 424 acres in 1990. Only 20 percent of the acreage had heavy damage compared to 80 percent in 1990 and 40 percent in 1989. Eggs present for 1991 are scarce in plantations that have had more than one year of consecutive damage. Look for damage to decrease in these areas in 1992, but to continue in newly infested plantations.

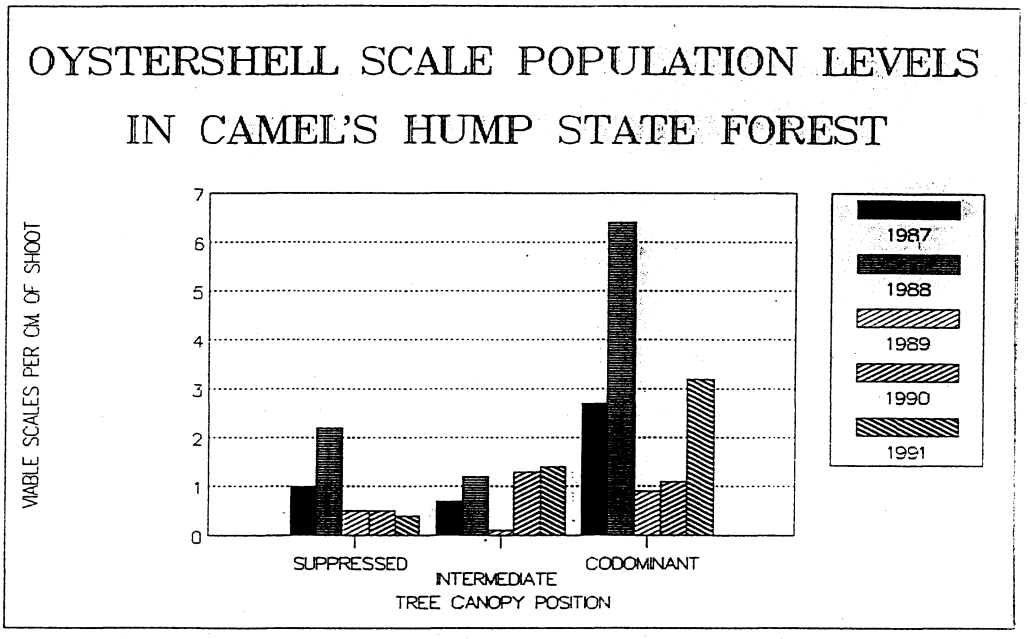
Oystershell Scale, Lepidosaphes ulmi, is currently causing little damage, but beech dieback associated with recent past infestations remains noticeable. An evaluation of scale population levels within Camel's Hump State Forest showed a noticeable increase in number of insects from overstory branches, but populations per linear centimeter remain below the high levels last seen in 1988 (Table 8, Figure 6).

Table 8. Number of Oystershell Scales on Current Year Twigs in Camel's Hump State Forest, 1987-1991*.

Tree Dominance	Average Number of Mature Viable Scales per: Twig					Millimeter				
	1987	1988	1989	1990	1991	1987	1988	1989	1990	1991
Suppressed	3.7	3.4	1.7	2.1	0.9	0.10	0.22	0.05	0.05	0.04
Intermediate	6.8	2.8	1.0	8.5	5.9	0.07	0.12	0.01	0.13	0.14
Codominant	9.3	8.8	3.7	7.4	10.7	0.27	0.64	0.09	0.11	0.32

*Average for 10 branches from one tree per dominance class, collected in Autumn, each year.

Figure 6.



Pear Thrips, Taeniothrips inconsequens, caused only a trace to very light damage of sugar maple in widely scattered locations in 1991. No defoliation was aerially mapped compared to 26,773 acres in 1990. Numbers of thrips emerging were fewer than in past years. Warm spring weather and adequate precipitation led to fairly rapid leaf expansion this year and probably reduced the thrips ability to cause damage.

Refoliation associated with thrips damage was highly variable this year, even within stands. Some trees refoliated quickly while others refoliated partially or not at all. Year-to-year refoliation and damage trends for individual trees have been equally variable. This year, some trees had portions of their crowns that were heavily defoliated, while the remainder received little visible damage.

OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Aphids *Cinara sp.*	Fraser Fir Scots Pine	Danville Morristown E.Albany	Lightly damaging 40 acres of Christmas trees; similar to 1990 in abundance--less damage.
Aphids *Periphyllus spp.*			N.o.
Balsam Gall Midge *Paradiplosis tumifex*	Balsam Fir		S.n.
Balsam Twig Aphid *Mindarus abietinus*	Balsam Fir		S.n.
Balsam Woolly Adelgid *Adelges piceae*	Balsam Fir		N.o.
Beech Scale *Cryptococcus fagisuga*	Beech		See Beech Bark Disease.
Birch Budgall Mite *Aceria rudis*	Birch		N.o.
Cooley Spruce Gall Adelgid *Adelges cooleyi*	White Spruce Blue Spruce	Wolcott	Light damage to Christmas trees; increase over 1990.
Cottony Maple Scale *Pulvinaria innumerabilis*	Sugar Maple	Shelburne	
Eastern Spruce Gall Adelgid *Adelges abietis*	Red Spruce White Spruce	Widespread	Decreasing; 32 acres of mostly light-moderate damage to white spruce Christmas trees compared to 82 acres of moderate-heavy damage in 1990. More calls on ornamentals than in 1990.

OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Eriophyid Mites *Eriophyidae*	White Pine	Lyndon	Moderate damage to single Christmas tree; not detected in the past.
Hemlock Woolly Adelgid *Adelges tsugae*	Hemlock		Not detected in northern region.
Lacebugs *Corythucha sp.*	American Elm Basswood	Washington Chittenden Franklin Counties	Stable; damage remains noticeable along roads and streams.
Leafhoppers	Sugar Maple Msc. hardwood	Widespread	Very light damage noticeable.
Lecanium Scale *Lecanium sp.*	Red Oak American Beech	Grand Isle	Very few detected.
Maple Spindle Gall Mites *Vasates aceris-crumena*	Sugar Maple	Widespread	Less noticeable than in previous years.
Oystershell Scale *Lepidosaphes ulmi*	American Beech		S.n.
Pear Thrips *Taeniothrips inconsequens*	Sugar Maple		S.n.
Pine Bark Adelgid *Pineus strobi*	White Pine	Throughout	Heavily infested individual trees, common in widely scattered locations.
Pine Leaf Adelgid *Pineus pinifoliae*	White Pine		N.o.
Pine Needle Midge *Contarinea baeri*	Scots Pine		N.o.
Pine Needle Scale *Chionapsis pinifoliae*	Mugho Pine	Waterford	Light damage

OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Pine Spittlebug *Aphrophora parallela*	Scots Pine White Pine	Widespread	60 acres of Scots Pine Christmas trees reported as infested, down from 1990. No shoot damage observed.
Pine Thrips *Gnophothrips sp.*	Scots Pine	Bakersfield Hyde Park	Moderate to heavy damage to 15 acres of Christmas trees.
Pine Tortoise Scale *Toumeyella parvicornis*	Scots Pine		N.o.
Root Aphid *Prociphilus americanus*	Balsam Fir Fraser Fir		N.o.
Spruce Bud Scale *Physokermes piceae*			N.o.
Spruce Spider Mite *Oligonychus ununguis*			N.o.
Treehoppers *Membracidae*			N.o.
Woolly Alder Aphid *Prociphilus tessellatus*	Alder	Franklin County	Very few.
Woolly Apple Aphid *Eriosoma lanigerum*	American Elm		N.o.
Ragged Spruce Gall Adelgid *Pineus similis*	Red Spruce	Wolcott Walden Brookfield	Some moderate-heavy Christmas tree damage-8 acres.

BUD, SHOOT, AND STEM INSECTS

The Balsam Shootboring Sawfly, Pleroneura brunneicornis, caused more damage than expected for what is usually an off (odd) year, but was still down from 1990 levels. Damage of Fraser and balsam fir was reported for 197 acres compared to 373 acres in 1990. Only 38 of these acres had moderate to heavy damage compared to 213 acres in 1990. Warm weather in early spring may have resulted in a greater abundance of this pest than expected. Look for heavier damage in 1992.

OTHER BUD, SHOOT AND STEM INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Allegheny Mound Ant *Formica exsectoides*	Ornamentals	Danville	Some mortality--one complaint.
Ambrosia Beetle *Scolytidae*	Paper Birch	Groton	Light damage. Similar to 1990.
Balsam Shoot-boring Sawfly *Pleroneura brunneicornis*	Balsam Fir		S.n.
Butternut Curculio *Conotrachelus juglandis*			N.o.
Coneworm *Dioryctria spp.*	Fraser Fir Spruces		N.o.
Locust Borer *Megacyllene robiniae*			N.o.
Maple Petiole Borer *Caulocampus acericaulis*			N.o.
Northern Pine Weevil *Pissodes approximatus*			N.o.
Pales Weevil *Hylobius pales*	Scots Pine	Widespread	Damage to Christmas trees similar to 1990; 134 acres of light to moderate damage reported.

VT

OTHER BUD, SHOOT AND STEM INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Pales Weevil *Hylobius pales*	Scots Pine	Widespread	Damage to Christmas trees similar to 1990, 134 acres of light to moderate damage reported.
Pine Gall Weevil *Podapion gallicola*	Red Pine	Thetford	Branch mortality continues in Thetford S.P.
Pine Root Collar Weevil *Hylobius radicus*	Scots Pine	Milton	Causing heavy mortality of small to overmature Christmas trees in a largely unmanaged plantation.
Pitch Nodule Maker *Petrova albicapitana* AND Zimmerman Pine Moth *Dioryctria zimmermani*	Scots Pine	Ferrisburg	Continue to cause branch and tree mortality in a 50 acre plantation. Visible during aerial survey this year.
Pitted Ambrosia Beetle *Corthylus punctatissimus*	Sugar Maple Seedlings	Franklin Caledonia Counties	Some damage visible; down from 1990.
Pseudanthonomus validus	Yellow Birch		N.o.
Round-headed Apple Tree Borer *Saperda candida*	Apple Mountain Ash	Lyndon Lunenburg	Damaging ornamentals in two locations.
Sugar Maple Borer *Glycobius speciosus*	Sugar Maple	Widespread	Abundant damage in many stands, especially where maples are slow-growing; two adults observed.
Twig Pruner *Elaphidionoides villosus*			N.o.

OTHER BUD, SHOOT AND STEM INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
White Pine Weevil *Pissodes strobi*	White Pine Scots Pine Blue Spruce Norway Spruce White Spruce Red Spruce Douglas Fir	Widespread	Reported for 171 acres of Christmas trees; similar to 1990 levels.
White Spotted Sawyer *Monochamus scutellatus*		Lamoille Caledonia Essex Addison Counties	Causing light-moderate Christmas tree damage. Not detected in 1990.

BARK BEETLES

INSECT	HOST(S)	LOCALITY	REMARKS
Bronze Birch Borer *Agrilus anxius*			N.o.
Eastern Larch Beetle *Dendroctonus simplex*	Eastern Larch	Widespread	Continues to decrease; only 19 acres of associated larch mortality (Orleans Co.) reported this year.
Elm Bark Beetles *Hylurgopinus rufipes* *Scolytus multistriatus*	American Elm	Widespread	See Dutch Elm Disease.
Pine Engraver *Ips pini*	Red Pine White Pine	Essex Fairlee	Light damage-Essex; caused considerable mortality of overstocked white pine-Fairlee.
Ips Avulsus	White Pine	Fairlee	Attacking the smooth-barked portions of trees being killed by *Ips pini*.

ROOT INSECTS

The Conifer Swift Moth, Korsheltellus gracilis, formerly called the Ghost Moth, continues to be found associated with feeding wounds on the roots of balsam fir and red spruce at high elevations in northern Vermont.

FOREST DISEASES

STEM DISEASES

Butternut Canker, caused by Sirococcus clavigignenta-juglandacearum, was discovered causing dieback and mortality of butternut in several new locations, including Bradford, Corinth, and Williamstown (Orange Counties); Stowe (Lamoille County); and Jericho (Chittenden County). This disease has resulted in more than 50 percent tree mortality in a Berlin stand that was first discovered as infected in 1986. Renewed interest in butternut canker is expected to lead to more intensive surveys in 1992 and beyond.

Beech Bark Disease, caused by Cryptococcus fagisuga and Nectria coccinea var. faginata, was less noticeable than last year with 888 acres mapped compared to 1,691 acres in 1990 (Table 9, Figure 7). This reflects a decrease in the Northeast Kingdom (516 acres in 1991 compared to 1,691 in 1990) and an increase in the Champlain Valley.

Table 9. Mapped Acres of 1991 Beech Decline and Mortality Due To Beech Bark Disease.

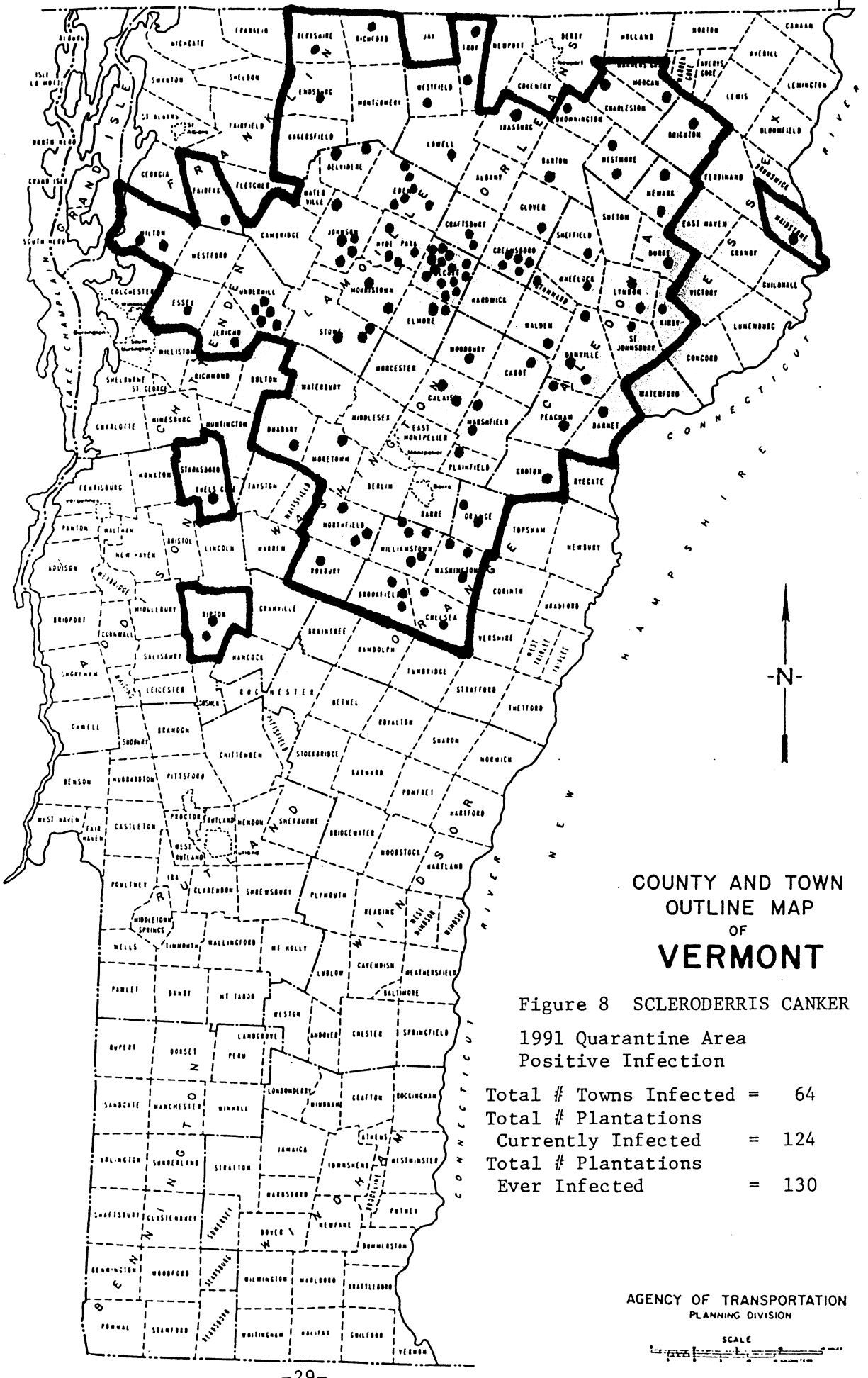
County	Acres
Addison	218
Chittenden	109
Essex	392
Franklin	45
Orleans	124
Total	888

Scleroderris Canker, caused by Ascocalyx abientina, was not found in any new locations for the fifth consecutive year. A total of 56 Christmas tree plantations within the quarantine zone (Figure 8), and 78 red and Scots pine plantations in seven towns bordering the quarantine area, were surveyed for the presence of the disease, all with negative results. The disease does not appear to be spreading outside of previously infected plantations, and within infested plantations the rate of spread remains slow.

The total number of plantations in the state known to be infected remains at 124, consisting of 106 red pine and 18 Scots pine plantations. This represents 842 and 150 acres respectively, for a total of 992 acres infected. Another six plantations were infected at one time, but have since had the disease eradicated or the trees cut. Some recent infection can be found within most of the quarantine zone.

OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Annual Canker Fusarium sp.	Sugar Maple		N.o.
Ash Yellows Mycoplasma-like organism	White Ash	St. Albans	Causing dieback and mortality of pole size and smaller trees; witches-brooms present.
Balsam Fir Twig Abnormality Sclerotinia kerneri	Balsam Fir		N.o.
Beech Bark Disease Cryptococcus fagisuga and Nectria coccinea var. faginata			S.n.
Black Knot Dibotryon morbosum	Cherry	Widespread	Remains common.
Butternut Canker Sirococcus clavigignenta-juglandacearum	Butternut		S.n.



COUNTY AND TOWN OUTLINE MAP OF VERMONT

Figure 8 SCLERODERRIS CANKER

1991 Quarantine Area
Positive Infection

Total # Towns Infected = 64
Total # Plantations Currently Infected = 124
Total # Plantations Ever Infected = 130

AGENCY OF TRANSPORTATION
PLANNING DIVISION

SCALE

JANUARY, 1979

OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Caliciopsis Canker *Caliciopsis pinea*	White Pine	Throughout	Remains common.
Chestnut Blight *Cryphonectria parasitica*	Chestnut	Colchester Monkton	Several roadside trees affected.
Cytospora Canker *Leucostoma Kunzei*	Blue Spruce	Widespread	Common on ornamentals.
Diplodia Shoot Blight *Diplodia pinea* (*Sphaeropsis pinea*)	Red Pine	Addison County	Throughout county.
Dutch Elm Disease *Ceratocystis ulmi*	American Elm	Throughout	Mortality, dieback and new infection commonly observed.
Eastern Dwarf Mistletoe *Arceuthobium pusillum*	Red Spruce		N.o.
Fir Broom Rust *Melampsorella caryophyllacearum*	Balsam Fir		N.o.
Fireblight *Erwinia amylovora*	Apple	Lyndon	Down from 1990.
Hypoxylon Canker *Hypoxylon pruinatum*	Quaking Aspen	Throughout	Remains common; trees frequently break off at canker during heavy snow and ice storms.
Maple Canker *Steganosporium sp.* *Nectria sp.*			N.o.
Oak Wilt *Ceratocystis fagacearum*	Oaks		No suspects detected by trained observers during aerial flights.
Phomopsis Blight *Phomopsis juniperovora*	Arborvitae	Peacham Brighton	Affecting cedar hedges.

VT

OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Sapstreak *Ceratocystis coerulescens*	Sugar Maple	Caledonia Washington Counties	Occasionally observed.
Scleroderris Canker *Asocalyx abietina*			S.n.
Sirococcus Shoot Blight *Sirococcus strobilinus*			N.o.
Verticillium Wilt *Verticillium albo-atrum* or *V. dahliae*			N.o.
White Pine Blister Rust *Cronartium ribicola*	White Pine	Throughout	Disease incidence on Christmas trees down; 66 acres infested compared to 291 acres in 1990.
Woodgate Gall Rust *Endocronartium harknessii*	Scots Pine	Throughout	Damage to Christmas trees decreased; 86 acres of light-mod. damage compared to 200 acres of mostly moderate damage in 1990.

FOLIAGE DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Anthracnose *Gloeosporium spp.*	Sugar Maple	Widely scattered	Down dramatically. Only light damage observed.
Cedar-Apple Rust *Gymnosporangium juniperi-virginianae*	Eastern Red Cedar Apple	Addison Chittenden Counties	Light damage.
Cyclaneusma Needlecast (formerly Naemacyclus) *Cyclaneusma minus*	Scots Pine	Throughout	Remains common but decreasing. Reported present in 103 acres of Christmas trees compared to 427 acres in 1990.

FOLIAGE DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
European Larch Needlecast *Mycosphaerella larcinia*	European Larch		N.o.
Fir-Fern Rust *Uredinopsis mirabilis*	Balsam Fir	Franklin Washington Orange Orleans Counties	Increasing; reported causing light-mod. needle loss in 8 plantations comprising 56 acres.
Lophodermium Needlecast *Lophodermium seditiosum*	Scots Pine	Widely scattered	Remains less common than Cyclaneusma at levels similar to 1990 in 4 Christmas tree plantations 919 acres).
Poplar Leaf Bronzing Virus or virus-like causal agent	Balsam Poplar	Caledonia Orleans Essex Counties	Remains common.
Rhabdocline Needlecast *Rhabdocline pseudotsugae*	Douglas Fir	Hardwick Wolcott Bakersfield Albany	Remains present but damage down somewhat; 8 acres of Christmas trees.
Rhizosphaera Needlecast *Rhizosphaera kalkhoffi*	White Spruce	Craftsbury Wolcott Bristol Middlebury	Six acres of Christmas trees; decrease since 1990.
Swiss Needlecast *Phaeocryptopus gaumanni*	Douglas Fir		Decreased; not detected in 1991.
Tar Spot *Ryhtisma acerinum*	Red Maple Silver Maple	Chittenden Lamoille Washington Orange Counties	Less common than in 1990. Only light damage.

ROOT ROTS

DISEASES	HOST(S)	LOCALITY	REMARKS
Annosus Root Rot Heterobasidion annosum			N.o.
Shoestring Root Rot Armillaria spp.	Balsam Fir	Stannard	Killing about 5% of Christmas trees in a naturally established 20 acre site containing trees of many ages. Elsewhere, common on stressed trees.

DIEBACKS, DECLINES AND ENVIRONMENTAL DISEASES

Ash Dieback remains common in the Champlain Valley area, especially where the basal area of white ash is substantial (i.e., 30% or more). Ash yellows, a mycoplasma-like organism, continues to be a factor in these lower elevation sites, especially in sites that are abandoned farm lands.

Birch Decline and scattered mortality remains present in areas that have been noticeable in the past, but trees appear to be recovering.

Drought Conditions in June and July led to various hardwood leaf conditions that were mapped on 54,675 acres throughout much of the region (Table 10, Figure 9). Sugar maple was the species most affected. Especially noticeable was Leaf Scorch on 49,929 acres in the Northeast Kingdom. In addition, hardwood chlorosis, mostly of maple, was detected on 4,307 acres in widely scattered locations. An additional 439 acres in the Northeast Kingdom had thin crowns as a result of drought-related leaf curling.

Table 10. 1991 Mapped Acres of Drought-Related Symptoms on Hardwoods

County	Leaf Scorch	Leaf Chlorosis	Thin Crowns	Total
Addison		1,313		1,313
Caledonia	14,483	510	124	15,117
Chittenden		697		697
Essex	28,886	499	133	29,518
Franklin		379		379
Grand Isle		39		39
Orleans	6,560	870	182	7,612
Total	49,929	4,307	439	54,675

Fertilizer Injury to a balsam fir Christmas tree plantation in Sheffield resulted from placing handfuls of 15-15-15 in spots near trees. The same method used in 1990 did not cause problems, but 1991 was a much drier year and root kill beneath the fertilizer spots resulted in branch dieback to portions of tree crowns and, in some cases, entire crowns.

Frost Damage due to a late spring frost on 19-20 May killed mostly scattered new growth on balsam fir and other Christmas trees throughout much of the region, and killed emerging leaves of sensitive hardwoods such as butternut, and to a lesser extent, white ash. Christmas tree damage was reported for 211 acres of balsam fir, 27 acres of white spruce, one acre of Scots pine, five acres of Douglas fir, four acres of white pine, and two acres of Fraser fir, for a total of 250 acres. Most of the heavy damagae (105 acres) occurred in Orleans County.

Larch Decline associated with past outbreaks of the eastern larch beetle has largely subsided, although older dead trees are still noticeable. Only 19 acres of larch mortality was detected by aerial survey this year (Orleans County).

Maple and associated Hardwood Decline was less noticeable than in previous years, and trees generally looked the best this year than they have in many years, with excellent foliage density, as recorded in most of our health monitoring plots. However, maple decline and hardwood decline remains visible in scattered locations, especially those that received past defoliation. This year, 3,328 acres of decline and mortality was mapped during aerial survey (Table 11, Figure 10).

Table 11. 1991 Mapped Acres of Maple and Hardwood Mortality and Dieback.

County	Maple Decline	Hardwood Decline	Total
Caledonia		164	164
Essex		2,784	2,784
Lamoille	2,060		2,060
Orleans	1,296	84	1,380
Washington	861		861
Total	4,217	3,032	7,249

White Pine Needle Blight, also called SNB (semimature tissue needle blight), was visible on widely scattered trees in Lamoille and Caledonia Counties. It was also responsible for unusually heavy damage to white pine Christmas trees within a four acre plantation in Williamstown and a five acre plantation in Brookfield (both in Orange County). This is the first very noticeable damage in four years.

Wind Damage resulted from localized down-drafts that blew down trees in several Franklin County and Grand Isle County locations. Damage was limited to areas three-to-five acres in size or less. Wind was also the apparent cause of the death of scattered, tender, elongating shoots of balsam fir Christmas trees in Walden and Bristol. The Maine Forest Service reported similar damage, attributing it to strong northwest winds from the passage of a cold front in late June.

Winter Injury was down compared to 1990, but 79 acres of light to moderate Christmas tree injury, mostly on Scots pine, was detected compared to 337 acres in 1990.

Red Spruce Mortality remains visible in scattered locations, especially high-elevation sites, but no recent mortality was reported. In Essex County 381 acres of high-elevation, dead spruce was mapped this year.

ANIMAL DAMAGE

ANIMAL	SPECIES DAMAGED	LOCALITY	REMARKS
Beaver	Many	Throughout	Populations continue to increase, with flooding damage common.
Deer	Many	Northeast Kingdom Shelburne	Scattered light damage; locally heavy damage-Shelburne.
Moose	Mountain Ash	Lemington	Heavy mountain top damage reported.
Mouse			N.o.
Porcupine	Many	Widely scattered	Increasing in Franklin, Chittenden, Addison and Caledonia Counties, but stable or decreasing elsewhere.
Sapsucker	White Birch Sugar Maple Norway Maple Hemlock Norway Spruce	Widespread	Remains common.
Squirrel	Maple Tubine	Peacham Hardwick Lunenburg	Heavy damage to maple tubing in these locations, but few complaints elsewhere.